

The formula Shuffle

Lindsey Vaughn, MS, RD, CSP, LD
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Objectives

- Breast milk vs formula
- Identify the major term infant formulas
- Explain the differences between term, hydrolyzed, soy, and elemental infant formulas
- Human error when formula feeding and when to change formulas
- Identify the major pediatric formulas
- Malnutrition guidelines (used to be FTT)
- When to supplement vs nutrition counseling alone

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Disclosures

- No disclosures to report

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Human Milk

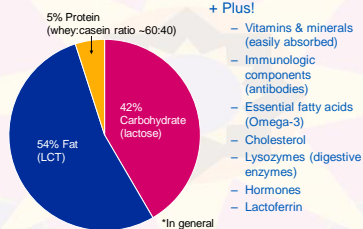
- Best nutrition for baby
 - served at the perfect temperature
- Contains the perfect amount of all nutrients
 - antibodies, water, fat, carbohydrates, protein, vitamins and minerals
- Helps baby resist disease and infection, strengthens immune system, decreases incidence of respiratory illness & ear infections, protects from allergies

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Nutrients of Human Milk

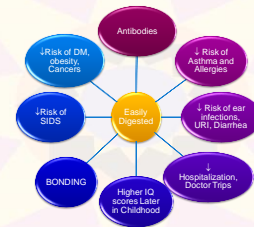


+ Plus!

- Vitamins & minerals (easily absorbed)
- Immunologic components (antibodies)
- Essential fatty acids (Omega-3)
- Cholesterol
- Lysozymes (digestive enzymes)
- Hormones
- Lactoferrin

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Breast Milk: Benefits to Baby



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Breast Milk: Benefits to Mother



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Infant Formulas

- Blue print = breast milk
- Nutrient composition of term infant formulas:
 - 42% carbohydrate
 - lactose
 - 48-49% fat
 - Palm olein, soy, coconut, high oleic sunflower oils, DHA, ARA (LCT)
 - 8-9% protein
 - Whey, nonfat milk

Human milk:
~42% CHO
~54% fat
~9% protein



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Formula Regulation

- FDA has set minimum levels for 29 nutrients and maximum levels for 9 of those nutrients
 - Protein, fat, linoleic acid, vitamins A, C, D, E, K, thiamin, riboflavin, B6, B12, niacin, folic acid, pantothenic acid, calcium, magnesium, iron, zinc, manganese, copper, phosphorus, iodine, NaCl, KCl, carbohydrates, nucleotides
- Ensures safety and nutritional quality of infant formula

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Vitamin D

- American Academy of Pediatrics (AAP) published guidelines:
 - Human milk contains a vitamin D concentration of 25 IU per liter or less.
 - Supplement of 400 IU per day of vitamin D is recommended for all breastfed infants.
 - Vitamin D can be stopped if an infant is weaned to vitamin-D fortified infant formula (consuming at least 1000 mL per day) or a child one year of age or older is weaned to vitamin-D fortified milk.

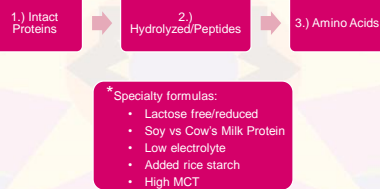
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Categories of Infant Formula



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Term formula

(Enfamil Premium Infant, Similac Advance)

- Healthy term infants
- 19/20 kcal/oz standard
- CHO – lactose
- Protein – whey, nonfat milk
- Fat- Long Chain Triglycerides
- Docohexinoic Acid (DHA)
Arachadonic Acid (ARA)
added



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Enfamil Premium Newborn

- Attempt by Enfamil to meet AAP guidelines for Vitamin D.
- 400 IU of vitamin D in 27 fl oz.
- Change to Enfamil NeuroPro at 3 months of age. 400 IU vitamin D in 33 oz.
- Missouri WIC



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Similac Advance

- Comparable nutrients (Vit D)
- Standard cow's milk infant formula
- "Pro" refers to the addition of 2-FL Human Milk Oligosaccharide – immune boosting prebiotic found in breastmilk
- Also have non-GMO and Organic options
- Kansas WIC



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Gerber Good Start Gentle

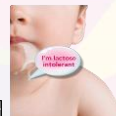
- "Comfort Proteins"
- Claim that it may reduce risk of Atopic Dermatitis



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Lactose Free Formula (Similac Sensitive, Enfamil Gentlease*)

- Uses corn syrup solids and/or sucrose as CHO source
- Lactose intolerance in infancy??



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Soy Formula

(Similac Soy Isomil, Enfamil Prosobee)

- Lactose free (glucose polymers)
 - Used for galactosemia
- Soy protein (cow milk protein free)
 - Used for cow milk protein allergy
 - 50% allergic to cow milk will also be allergic to soy
- Phytates inhibit calcium absorption
- Isoflavones = estrogen like activity
 - Safety of long-term use not established
- High aluminum content



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Added Rice Formula

(Enfamil AR, Similac Sensitive Spit-Up)

- Designed to thicken when it hits the acid pH of the stomach
 - Does not work if on a pH altering drug



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Low Electrolyte Formula

(Similac PM 60:40)

- 80% of the Na
- 66% of the phosphorous
- 82% of the K
- 70% of the calcium
- Low Iron Formula
 - Need supplemental iron



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High MCT Formulas

(Enfaport)

- 85% MCT oil
- Used for:
 - Chyllothorax
 - Lymphangiectasia



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Protein Hydrolysate Formula (Alimentum, Nutramigen, Pregestimil)

- Hydrolyzed protein (peptides)
- Lactose free
- All LCT vs. MCT/LCT mix
- Used for GI disturbances or intolerances



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Amino Acid based Formula

Formulas

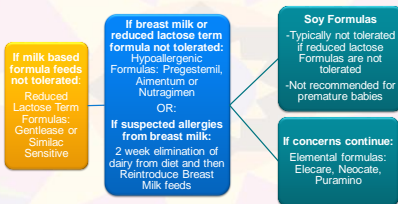
- Elecare Infant
- Neocate Infant
- PurAmino



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Formula Algorithm



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Cost

- Breast feeding
 - ~ \$250.00 per year to consume the extra 400-600 kcal per day.
- Formula
 - Similac Advance \$1800/yr.
 - Similac Expert Care Neosure \$2400/yr
 - Alimentum \$2900/yr.
 - Elecare \$5000-7200/yr.

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Preterm Infant Formula (Similac Special Care, Enfamil Premature)

- Rapidly growing preterm infants
- 24 kcal/oz standard
- DHA & ARA added
- Increased amounts of nutrients
 - Calories, protein, calcium, phosphorous, sodium
- CHO ~50:50 lactose:glucose polymers
- Protein: cow milk protein
- Fat: ~50:50 LCT:MCT
- <34 weeks Gestational Age



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Human Milk Fortifier

- Adds kcals, calcium, phosphorus, protein to breast milk
- Not appropriate supplement for kcals only in older or term babies
- <34 weeks Gestational Age
- Only indicated until 3.6 kg (8#)
- Similac Human Milk Fortifier Liquid
- Enfamil Human Milk Fortifier Acidified Liquid



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Preterm Discharge Formula (Similac Expert Care Neosure, Enfamil Enfacare)

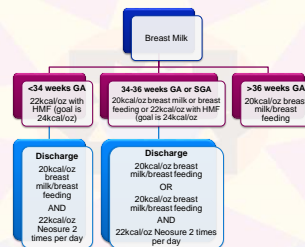
- Former preterm infants or Late preterm (34-36 week GA) infants
- 22 kcal/oz standard
- DHA & ARA added
- Increased amounts of nutrients
 - Calories, protein, calcium, phosphorous, sodium
- CHO ~50:50 lactose:glucose polymers
- Protein: cow milk protein
- Fat: ~25% MCT



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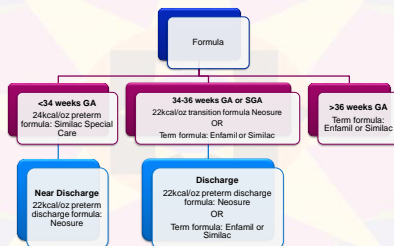
Breast Milk Algorithm



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Formula Algorithm by GA



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Toddler Formulas

- 20kcal/oz Standard-can go up to 27kcal
- Whole milk is 19kcal/oz



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Formula



- Methods of concentrating infant formula
 - Altering formula recipe
 - Can increase to 22 kcal/oz, 24 kcal/oz, or 26 kcal/oz
 - Adding Modulators
 - Carbohydrates
 - Fat
 - Protein

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Carbohydrate



- Solcarb
- Purecarb



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Fat



- Microlipid-Provides only calories. Expensive
- MCT oil-Appropriate for fat malabsorption
- Liquigen-Appropriate for fat malabsorption. Emulsified
- Vegetable Oil-inexpensive

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Protein



- Liquid Protein-Does not add calories when added to liquid formula. Extensively hydrolyzed. Not available outpatient
- Beneprotein-Increase RSL/Osmolality

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Common Feeding Mistakes



- Overfeeding
 - Babies typically only need 2-6 oz per feed depending on age
 - Babies with reflux will eat more to try to get gastric acid feeling out of their throat, this leads to emesis
 - Babies will use the breast or bottle for comfort, this can lead to over-eating then emesis
- Mixing incorrectly
 - Saving formula (cost)
 - Padding formula (to make baby full)
 - Mixing formula first, then water

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Pediatric Formulas

- Standard
- High Calorie
- Clear Liquid
- Soy Based
- Peptide or Amino Acid Based
- Food Blends

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Standard Pediatric Formula

- Pediasure Oral
- Pediasure with Fiber
- Enteral Pediasure



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High Calorie Pediatric Formula

- Boost Kid Essentials 1.5
- Pediasure 1.5



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Clear Liquid

- Resource Breeze



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Soy Based

- Bright Beginnings Soy



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Peptide Based

- Peptamen Jr
- Peptamen Jr with Prebio
- Peptamen Jr with Prebio 1.5
- PediaSure Peptide



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Elemental

- Vivonex Pediatric
- Elecare Junior
- Neocate Splash



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Premade Blended Formulas

Compleat & Compleat Organic Blends

Liquid Hope & Nourish



Real Food Blends

Kate Farms

PediaSure Harvest



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Pediatric Malnutrition Indicators- single data point available

Data Points:	Mild Malnutrition:	Moderate Malnutrition:	Severe Malnutrition:
Wt-for-In Z-score (<2 years old)	-1 to -1.9 Z-score	-2 to -2.9 Z-score	-3 or greater Z-score
BMI Z-score (>2 years old)	-1 to -1.9 Z-score	-2 to 2.9 Z-score	-3 or greater Z-score
Length/Height for age Z-score	(no data)	(no data)	-3 Z-score*
Mid-upper arm circumference (MUAC)	-1 to -1.9 Z-score	-2 to -2.9 Z-score	-3 or greater Z-score

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Pediatric Malnutrition Indicators- multiple data points available

Data Points:	Mild Malnutrition:	Moderate Malnutrition:	Severe Malnutrition:
Wt gain velocity (<2 years old)	<75 % of expected wt gain	<50% of expected weight gain	<25% of expected weight gain
Weight loss (>2 years old)	5% of usual body weight	7.5% of usual body weight	10% of usual body weight
Decline in weight for length/height	Decline of 1 z score	Decline of 2 z score	Decline of 3 z score
Inadequate nutrient intake	*Do not use this indicator independently		

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Frequently asked questions

- For premature infants do I use corrected age or actual age? (corrected age)
- If I have multiple data plots can I use the single data point criteria to diagnose? (yes)
- My patient meets multiple criteria (mild for BMI but severe for MUAC). Which one do I use? (use the most severe)

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Case Study

- 10 month old female
 - Weight: 5.5kg 0%ile z-score -3.68
 - Length: 65cm 0%ile z-score -2.63
 - Weight-for-length: 0%ile z-score -2.91
 - MUAC: 13cm z-score -1 to -2
- What growth chart do you use? What is the child's IBW? What is her weight age? Is the child malnourished? If so, what severity?

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Answers

- WHO growth chart for girls
- IBW: 7kg (78% IBW)
- Weight age: 2.5 months
 - Catch-up growth = 12-24gm/day (vs. 8gm/day for actual age)
- Yes; moderate malnutrition based on weight-for-length z-score

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Best Ways to treat malnutrition

- Use your clinical judgement! Let's discuss.
 - Is it acute or chronic?
 - What is the severity?
 - Does the child have a good diet or picky?
 - Does the child have a feeding tube and working towards oral feeds?
 - What is the home situation?

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Thank You!

Questions? Thank you to CMH employees that contributed to this talk!


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